

SUMMARY OF 2003 SEATTLE ENERGY CODE AMENDMENTS

(15 August 2004)

The 2003 Seattle Energy Code consists of the 2003 Washington State Energy Code with Seattle amendments to the nonresidential provisions. While the first comprehensive Seattle Energy Code took effect in February 1980, Seattle has had residential insulation requirements since 1974 and the first furnace sizing and duct insulation requirements took effect in 1927. Seattle has regularly updated its Energy Code to incorporate changes in technology and to improve implementation. This Energy Code update coincides with publication of the 2003 Washington State Energy Code and with Statewide adoption of the 2003 Building and Mechanical Codes.

The goals for this Seattle Energy Code update cycle are to:

- to improve implementation of existing amendments and
- to achieve the energy savings specified in Resolution 30280.

Resolution 30280 (Section 1.B.i) directs DPD and Seattle City Light to “propose to the City Council...amendments to the Seattle Energy Code...to achieve up to 20% enhanced energy efficiency beyond the current version of ASHRAE/IESNA Standard 90.1”. For the 2003 Seattle Energy Code update, the net energy savings from the amendments would likely be modest as it is estimated that the existing Seattle Energy Code already achieves more than 15% energy savings compared to ASHRAE/IESNA Standard 90.1.

The key changes address the requirements for alterations to existing mechanical systems, building envelope criteria for semi-heated spaces, demand control ventilation for assembly spaces, economizer cycles, and mechanical equipment efficiencies. The majority of the existing Seattle amendments to the Washington State Energy Code are unchanged. As is the case with the current Seattle Energy Code, there are no Seattle residential amendments to the Washington State Energy Code.

These changes were refined in a series of public review meetings and reflect the recommendations of the DPD Construction Codes Advisory Board. DPD expresses its gratitude for all of those who participated in these meetings. Their efforts will result in a Seattle Energy Code that is more workable for all.

The public review process is summarized below, followed by a section-by-section discussion of the changes.

PUBLIC REVIEW PROCESS

In the fall of 2003, DPD indicated that it would begin a public review of proposed amendments to the Seattle Energy Code in January 2004. Staff from DPD and Seattle City Light developed a proposal that was released on 14 January 2004. Seattle DPD announced the beginning of the public review and a series of review meetings in an e-mail to the Seattle Energy Code e-mail list, in an e-mail to the CCAB e-mail list, and in a mailing to DPD's Energy Code mailing list.

Copies of the material were also posted on the DPD Seattle Energy Code website.

The following public review meetings have been held: 20 January 2004 (overview), 29 January 2004 (lighting and building envelope), 5 February 2004 (economizer and mechanical alterations), 12 February 2004 (mechanical, including alterations), 26 February 2004 (mechanical, including alterations), and 4 March 2004 (economizer and mechanical alterations).

In addition, DPD staff participated in other meetings to present the recommendations and to solicit comments: ASHRAE Puget Sound Chapter monthly workshop on 14 January 2004 (mechanical equipment efficiency), BOMA Code Committee meeting on 27 January 2004 (mechanical alterations), ASHRAE Puget Sound Chapter TEGA Committee on 2 February 2004 (mechanical), and BOMA Energy Code meeting on 10 February 2004 (mechanical alterations).

The initial public review period for written comments closed on 24 February 2004. An additional public review period on the economizer provisions and mechanical alterations extended until 12 March 2004.

DPD developed a revised draft of proposed revisions in response to comments made at the various meetings and written testimony. The DPD Construction Codes Advisory Board (CCAB) reviewed the draft revisions to the Seattle Energy Code at their meetings on March 4 and March 18. CCAB met on April 8 to vote on their final recommendations. CCAB recommended relatively minor changes to the DPD proposals, affecting mechanical alterations (Section 1132.2), heat recovery (Section 1436.1), equipment sizing limits (Section 1431.2), and how task lighting is treated (Section 1530).

DPD supported the CCAB recommendations. DPD staff briefed the City Council's Urban Development & Planning Committee on 26 May 2004. The Mayor forwarded the Seattle Energy Code ordinance to the Seattle City Council early in June, along with 5 other construction code ordinances including the Building Code and the Mechanical Code. The Seattle Energy Code ordinance was considered by the City Council's Urban Development & Planning Committee on 29 June 2004. The full Council adopted the ordinance on 6 July 2004 and it was signed by the Mayor ten days later.

CODE AMENDMENTS

A summary of changes to Seattle amendments follows below. The amendments apply to nonresidential occupancies. (There are no changes for Group R occupancy.)

Amendments

The amendments are limited to the following:

- 701: Update references and add Seattle EnvStd.
- 1132.2: (1) Revise requirements for alterations to existing mechanical systems to clarify requirements for economizer, and (2) provide simpler prescriptive options to achieve energy savings for both heating and cooling for certain situations in lieu of full compliance with air economizer requirements.
- 1132.3: Clarify application of daylighting requirements.
- 1301: Revise exception 5 to reflect changes to criteria for semi-heated spaces.
- 1310.2: Revise to parallel Oregon State Energy Code.
- 1331: (1) Refer to Seattle EnvStd and (2) add exception for use of prescriptive street-level retail option.
- 1411.1: Clarify intent for restrictions on single-pass cooling.
- 1412.9: Add requirement for demand ventilation controls.
- 1413.1: Revise to eliminate 35 degree exception for waterside economizer. (Companion to 1433.)
- 1431.2: Increase sizing allowance to account for unusual situations.
- 1433: (1) Clarify intent for small units and split systems, (2) provide exception with prescriptive code alternate to achieve equivalent energy savings to airside economizer in buildings with water-source heat pump loops in lieu of waterside economizer, and (3) add new exception with prescriptive alternate for server rooms with high cooling loads.
- 1436.1: (1) Address heat recovery for systems with high loads, and (2) clarify that exceptions only apply to particular exhaust subsystems.
- 1436.2: (1) Define “on-site” for the purposes of condensate heat recovery, and (2) add requirement for condensate heat recovery for steam systems without condensate water recovery.
- 1436.3: Add compliance option for condenser water heat recovery.
- 1438.1: Limit options to variable speed drive and pony motors.
- Tables 14-1A & 14-1B: Add 2006 efficiency requirements from Standard 90.1.
- Table 14-1C: Add equivalent rating in kW/ton to simplify compliance.
- Table 14-1D: Add requirements for SPVAC and SPVHP from Standard 90.1.
- 1513.3: Incorporate Director’s Rule 2-2003.
- 1530: Count task lighting as 50 Watts per foot of track (rather than 70).
- Table 15-1: Clarify the application to sport tournament lighting, retail window exemption.

Existing Seattle Amendments Retained – No Changes

The Seattle amendments to the following sections and tables were retained with no changes:

Table 10-5B Default U-Factors for Concrete and Masonry Walls.

Table 10-6 Other than Group R Occupancy: Default U-Factors for Vertical Glazing, Overhead Glazing and Opaque Doors.

1133 Change of Occupancy or Use.

1144 Violations and Penalties.

1150 Conflicts With Other Codes.

1161 Severability.

1162 Liability.

1311.6 Radiant Floors.

1312.2 Solar Heat Gain Coefficient and Shading Coefficient.

1322 Opaque Envelope.

1323 Glazing.

1333 UA Calculations.

Table 13-1 Building Envelope Requirements.

1402 Mechanical Ventilation.

1411.2 Rating Conditions.

1411.4 Packaged Electric Heating and Cooling Equipment.

1411.5 Heating Systems in Unenclosed Spaces.

1412 Controls.

1413.3 Integrated Operation.

1413.5 Economizer Heating System Impact.

1414 Ducting Systems.

1416 Mechanical Systems Commissioning and Completion Requirements.

1421 System Type.

1421.1 System Sizing Limits.

1423 Economizers.

1432.2.2 Hydronic Systems.

1435 Simultaneous Heating and Cooling.

1437 Electric Motor Efficiency.

1438 Variable Flow Systems and System Criteria.

1440 Service Water Heating.

1452 Pool Water Heaters.

Tables 14-1K/L/M IPLV/NPLV for Water Cooled Chillers.

1510 General.

1512 Exempt Lighting.

1513.1 Local Control and Accessibility.

1513.5 Automatic Shut-off Controls, Exterior.

1513.6 Automatic Shut-off Controls, Interior.

1521 Prescriptive Interior Lighting Requirements.

1540 Transformers.

RS-29, Section 3.6.5, Parking Garage Ventilation.

SECTION-BY-SECTION SUMMARY

701 Standards.

Discussion: Update references and add reference to Seattle EnvStd. Companion change to Section 1331.

Revision: Revise as follows -

Section 701 Standards: The following standards shall apply to Chapters 1 through 20. The standards and portions thereof, which are referred to in various parts of this Code shall be part of the Washington State Energy Code and are hereby declared to be a part of this Code.

CODE STANDARD

NO. TITLE AND SOURCE

RS-1	2001 ASHRAE Fundamentals Handbook.
RS-2	Super Good Cents Technical Reference (Builder's Field Guide).
RS-3:	(Reserved.)
RS-4	ASHRAE Standard 55-92 Thermal Environmental Conditions for Human Occupancy.
RS-5	1998 ASHRAE Refrigeration Handbook.
RS-6	SMACNA, Installation Standards for Residential Heating and Air Conditioning Systems, 6th Edition, 1988.
RS-7	SMACNA, HVAC Duct Construction Standards Metal and Flexible, 2nd Edition, 1995.
RS-8	SMACNA, Fibrous Glass Duct Construction Standards, 6th Edition, 1992.
RS-9	ASHRAE/IESNA Standard 90.1-2001, Energy Standard for Buildings Except Low-Rise Residential Buildings.
RS-10	2000 ASHRAE Systems & Equipment Handbook.
RS-11	2003 ASHRAE HVAC Applications Handbook.
RS-12 – RS-28: (Reserved.)	
RS-29	Nonresidential Building Design by Systems Analysis.
RS-30	Title 10, Code of Federal Regulations (CFR), Part 430 (March 14, 1988).
RS-31	National Fenestration Rating Council (NFRC) Standard 100-2001.
RS-32	Seattle EnvStd, available for download at the Seattle Energy Code homepage at: http://www.seattle.gov/dpd/energy .

ACCREDITED AUTHORITATIVE AGENCIES

ANSI refers to the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036

Phone (212) 642-4900 Fax (212) 398-0023, Internet www.ansi.org

ARI refers to the Air-Conditioning and Refrigeration Institute, 4301 N. Fairfax Dr., Suite 425, Arlington, VA 22203

Phone (703) 524-8800 Fax (703) 528-3816, Internet www.ari.org

ASHRAE refers to the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle, N.E., Atlanta, GA 30329

Phone (404) 636-8400 Fax (404) 321-5478, Internet www.ashrae.org

ASTM refers to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959

Phone (610) 832-9585 Fax (610) 832-9555, Internet www.astm.org

CTI refers to the Cooling Tower Institute, 530 Wells Fargo Drive, Suite 218, Houston, TX 77090

Phone (281) 583-4087 Fax (281) 537-1721, Internet www.cti.org

IESNA refers to the Illuminating Engineering Society of North America, 120 Wall Street, Floor 17, New York, NY 10005-4001

Phone (212) 248-5000 Fax (212) 248-5017, Internet www.iesna.org

NFRC refers to the National Fenestration Rating Council, Inc., 8484 Georgia Avenue, Suite 320, Silver Spring, Maryland 20910

Phone (301) 589-1776 Fax (301) 589-3884, Internet www.nfrc.org

SMACNA refers to the Sheet Metal and Air Conditioning Contractors National Association, Inc., 4201 Lafayette Center Drive, P.O. Box 221230, Chantilly, VA 20153-1230

Phone (703) 803-2980 Fax (703) 803-3732, Internet www.smacna.org

1132.2 Building Mechanical Systems.

Discussion: Revise requirements for alterations to existing mechanical systems to clarify requirements for economizer. In addition, provide simpler prescriptive options to achieve energy savings for both heating and cooling for certain situations in lieu of full compliance with air economizer requirements. The prescriptive options for better controls, such as variable speed drive pumps and econocoils, are based on measures used in current designs and/or Seattle City Light incentive programs. The prescriptive options with an efficiency that is 5 or 10% higher than the base table values are based on recommendations from the public review meetings. The New Building Institute's (NBI) E-Benchmark lists efficiencies that are generally 15% higher than the base table values. E-Benchmark can be viewed on the NBI website at: <http://www.newbuildings.org/ebenchmark/index.htm>. A database of high-efficiency equipment is located on the Consortium for Energy Efficiency's (CEE) website at: <http://www.cee1.org/com/hecac/hecac-main.php3>. Cooling tower requirements reflect Washington State Building Code Council interpretation 94-78.

Revision: Revise as follows -

1132.2 Building Mechanical Systems: Those parts of systems which are altered or replaced shall comply with Chapter 14 of this Code.

All new systems in existing buildings, including packaged unitary equipment and packaged split systems, shall comply with Chapter 14.

Where mechanical cooling is added to a space that was not previously cooled, the mechanical cooling system shall comply with Sections 1413 and either 1423 or 1433.

EXCEPTIONS: These exceptions only apply to situations where mechanical cooling is added to a space that was not previously cooled.

1. Water-cooled refrigeration equipment provided with a water economizer meeting the requirements of [Section 1413](#) need not comply with 1423 or 1433. This exception shall not be used for RS-29 analysis.
2. Alternate designs that are not in full compliance with this Code may be approved when the Building Official determines that existing building or occupancy constraints make full compliance impractical or where full compliance would be economically impractical.

Alterations to existing mechanical cooling systems shall not decrease economizer capacity unless the system complies with Sections 1413 and either 1423 or 1433. In addition, for existing mechanical cooling systems that do not comply with Sections 1413 and either 1423 or 1433, including both the individual unit size limits and the total building capacity limits on units without economizer, other alterations shall comply with Table 11-1, except for approved long-term plans that comply with the 2002 Seattle Energy Code and were submitted prior to 1 July 2004.

Existing equipment currently in use may be relocated within the same floor or same tenant space if removed and reinstalled within the same permit.

Table 11-1: Economizer Compliance Options for Mechanical Alterations

	Option A	Option B (alternate to A)	Option C (alternate to A)	Option D (alternate to A)
Unit Type	Any alteration with new or replacement equipment	Replacement unit with the same or smaller output capacity	Replacement unit with a larger output capacity	New equipment added to existing system
Packaged Units	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: min. ¹ Economizer: 1433 ^{2,3}	Efficiency: min. ¹ Economizer: 1433 ^{2,3}	Efficiency: min. ¹ Economizer: 1433 ^{2,4}
Split Systems	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: + 10/5% ⁵ Economizer: shall not decrease existing economizer capability	<u>Only for new units < 54,000 Btuh replacing unit installed prior to 1991 (one of two):</u> Efficiency: + 10/5% ⁵ Economizer: 50% ⁶	Efficiency: min. ¹ Economizer: 1433 ^{2,4}
			For units > 54,000 Btuh or any units installed after 1991: Option A	
Water Source Heat Pump	Efficiency: min. ¹ Economizer: 1433 ²	<u>(two of three):</u> Efficiency: + 10/5% ⁵ Flow control valve ⁷ Economizer: 50% ⁶	<u>(three of three):</u> Efficiency: + 10/5% ⁵ Flow control valve ⁷ Economizer: 50% ⁶ (except for certain pre-1991 systems ⁸)	Efficiency: min. ¹ Economizer: 1433 ^{2,4} (except for certain pre-1991 systems ⁸)
Hydronic Economizer using Air-Cooled Heat Rejection Equipment (Dry Cooler)	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: + 10/5% ⁵ Economizer: shall not decrease existing economizer capacity	Option A	Efficiency: min. ¹ Economizer: 1433 ^{2,4}
Air-Handling Unit (including fan coil units) where the system has an air-cooled chiller	Efficiency: min. ¹ Economizer: 1433 ²	Economizer: shall not decrease existing economizer capacity	Option A (except for certain pre-1991 systems ⁸)	Option A (except for certain pre-1991 systems ⁸)

	Option A	Option B (alternate to A)	Option C (alternate to A)	Option D (alternate to A)
Unit Type	Any alteration with new or replacement equipment	Replacement unit with the same or smaller output capacity	Replacement unit with a larger output capacity	New equipment added to existing system
Air-Handling Unit (including fan coil units) and Water-cooled Process Equipment, where the system has a water-cooled chiller ¹⁰	Efficiency: min. ¹ Economizer: 1433 ²	Economizer: shall not decrease existing economizer capacity	Option A (except for certain pre-1991 systems ⁸ and certain 1991-2004 systems ⁹ .)	Efficiency: min. ¹ Economizer: 1433 ^{2,4} (except for certain pre-1991 systems ⁸ and certain 1991-2004 systems ⁹)
Cooling Tower	Efficiency: min. ¹ Economizer: 1433 ²	No requirements	Option A	Option A
Air-Cooled Chiller	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: + 5% ¹¹ Economizer: shall not decrease existing economizer capacity	Efficiency (two of two): (1) + 10% ¹² and (2) multistage Economizer: shall not decrease existing economizer capacity	Efficiency: min. ¹ Economizer: 1433 ^{2,4}
Water-Cooled Chiller	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency (one of two): (1) + 10% ¹³ or (2) plate frame heat exchanger ¹⁵ Economizer: shall not decrease existing economizer capacity	Efficiency (two of two): (1) + 15% ¹⁴ and (2) plate-frame heat exchanger ¹⁵ Economizer: shall not decrease existing economizer capacity	Efficiency: min. ¹ Economizer: 1433 ^{2,4}
Boiler	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: + 8% ¹⁶ Economizer: shall not decrease existing economizer capacity	Efficiency: + 8% ¹⁶ Economizer: shall not decrease existing economizer capacity	Efficiency: min. ¹ Economizer: 1433 ^{2,4}

1. Minimum equipment efficiency shall comply with Section 1411.1 and Tables 14-1A through M.
2. System and building shall comply with Section 1433 (including both the individual unit size limits and the total building capacity limits on units without economizer). It is acceptable to comply using one of the exceptions to Section 1433.
3. All equipment replaced in an existing building shall have air economizer complying with Sections 1413 and 1433 unless both the individual unit size and the total capacity of units without air economizer in the building is less than that allowed in Exception 1 to Section 1433.
4. All separate new equipment added to an existing building shall have air economizer complying with Sections 1413 and 1433 unless both the individual unit size and the total capacity of units without air economizer in the building is less than that allowed in Exception 1 to Section 1433.
5. Equipment shall have a capacity-weighted average cooling system efficiency:
 - a. for units with a cooling capacity below 54,000 Btuh, a minimum of 10% greater than the requirements in Tables 14-1A and 14-1B (1.10 x values in Tables 14-1A and 14-1B).
 - b. for units with a cooling capacity of 54,000 Btuh and greater, a minimum of 5% greater than the requirements in Tables 14-1A and 14-1B (1.05 x values in Tables 14-1A and 14-1B).
6. Minimum of 50% air economizer that is ducted in a fully enclosed path directly to every heat pump unit in each zone, except that ducts may terminate within 12 inches of the intake to an HVAC unit provided that they are physically fastened so that the outside air duct is directed into the unit intake. If this is an increase in the amount of outside air supplied to this unit, the outside air supply system shall be capable of providing this additional outside air and equipped with economizer control.
7. Have flow control valve to eliminate flow through the heat pumps that are not in operation with variable speed pumping control complying with Section 1432.2.2 for that heat pump.
 - Effective 1 July 2005, if not already installed, variable frequency drive shall be installed on the main loop pump at this time regardless of the pump size.
 - As an alternate to this requirement, have a capacity-weighted average cooling system efficiency that is 5% greater than the requirements in note 5 (i.e. a minimum of 15%/10% greater than the requirements in Tables 14-1A and 14-1B (1.15/1.10 x values in Tables 14-1A and 14-1B)).
8. Systems installed prior to 1991 without fully utilized capacity are allowed to comply with Option B, provided that the individual unit cooling capacity does not exceed 90,000 Btuh.
9. Economizer not required for systems installed with water economizer plate and frame heat exchanger complying with previous codes between 1991 and June 2004, provided that the total fan coil load does not exceed the existing or added capacity of the heat exchangers.
10. For water-cooled process equipment where the manufacturers specifications require colder temperatures than available with waterside economizer, that portion of the load is exempt from the economizer requirements.
11. The air-cooled chiller shall have an IPLV efficiency that is a minimum of 5% greater than the IPLV requirements in Table 14-1C (1.05 x IPLV values in Table 14-1C).
12. The air-cooled chiller shall:
 - a. have an IPLV efficiency that is a minimum of 10% greater than the IPLV requirements in Table 14-1C (1.10 x IPLV values in Table 14-1C), and
 - b. be multistage with a minimum of two compressors.
13. The water-cooled chiller shall have an NPLV efficiency that is a minimum of 10% greater than the NPLV requirements in Table 14-1K, Table 14-1L, or Table 14-1M (1.10 x NPLV values in Table 14-1K, Table 14-1L, or Table 14-1M).

14. The water-cooled chiller shall have an NPLV efficiency that is a minimum of 15% greater than the NPLV requirements in Table 14-1K, Table 14-1L, or Table 14-1M (1.15 x NPLV values in Table 14-1K, Table 14-1L, or Table 14-1M).
15. Economizer cooling shall be provided by adding a plate-frame heat exchanger on the waterside with a capacity that is a minimum of 20% of the chiller capacity at standard ARI rating conditions.
16. The replacement boiler shall have an efficiency that is a minimum of 8% higher than the value in Table 14-1F (1.08 x value in Table 14-1F), except for electric boilers.

1132.3 Lighting and Motors.

Discussion: Clarify application of daylighting requirements. Incorporate Director's Rule 2-2003.

Revision: Revise as follows -

1132.3 Lighting and Motors: Where the use in a space changes from one use in Table 15-1 to another use in Table 15-1, the installed lighting wattage shall comply with Section 1521 or 1531.

Other tenant improvements, alterations or repairs where 60 percent or more of the fixtures in a space enclosed by walls or ceiling-height partitions are new shall comply with Sections 1531 and 1532. (Where this threshold is triggered, the areas of the affected spaces may be aggregated for code compliance calculations.)

Where less than 60 percent of the fixtures in a space enclosed by walls or ceiling-height partitions are new, the installed lighting wattage shall be maintained or reduced. Where 60 percent or more of the lighting fixtures in a suspended ceiling are new, and the existing insulation is on the suspended ceiling, the roof/ceiling assembly shall be insulated according to the provisions of Chapter 13, Section 1311.2.

Where new wiring is being installed to serve added fixtures and/or fixtures are being relocated to a new circuit (except as noted in the following paragraph), controls shall comply with Sections 1513.1 through 1513.5 and 1513.7. For compliance with Section 1513.3.2 for existing luminaires where the existing ballasts are not being changed, the number of required incremental steps of automatic daylighting control shall be equal to one plus the number of ballasts in the luminaire. In addition, office areas less than 300 ft² enclosed by walls or ceiling-height partitions, and all meeting and conference rooms, and all school classrooms, shall be equipped with occupancy sensors that comply with Section 1513.6. Where a new lighting panel (or a moved lighting panel) with all new raceway and conductor wiring from the panel to the fixtures is being installed, controls shall also comply with the other requirements in Section 1513.6.

Where new walls or ceiling height partitions are added to an existing space and create a new enclosed space, but the lighting fixtures are not being changed, other than being relocated, the new enclosed space shall have controls that comply with Sections 1513.1 through 1513.2 and 1513.4 through 1513.7.

Those motors which are altered or replaced shall comply with Section 1511.

1301 Scope.

Discussion: Revise exception 5 to reflect changes to criteria for semi-heated spaces. Companion change to 1310.

Revision: Revise as follows -

1301 Scope: Conditioned buildings or portions thereof shall be constructed to provide the required thermal performance of the various components according to the requirements of this chapter. Unless otherwise approved by the building official, all spaces shall be assumed to be at least semi-heated.

EXCEPTIONS: 1. Greenhouses isolated from any conditioned space and not intended for occupancy.

2. As approved by the building official, spaces not assumed to be at least semi-heated.

3. Unconditioned Group U occupancy accessory to Group R occupancy.

4. Unstaffed equipment shelters or cabinets used solely for personal wireless service facilities.

5. Parking lot attendant booths no larger than 100 square feet, provided that the roof insulation is R-21 minimum and the wall insulation is R-13 minimum, unless otherwise allowed by Section 1310.

1310 General.

Discussion: Revise criteria for semi-heated spaces heated by other fuels to reflect proposed revision to the Washington State Energy Code. Requires roofs and floors to be fully insulated at the time of initial construction, when it is most cost-effective to insulate. Wall insulation is allowed to be done later when the space is converted from a semi-heated space to a fully-heated space. (No change for semi-heated spaces with electrically resistance space heat, which are currently required to be fully insulated to minimize impacts on peak electric system load.)

Revision: Revise as follows -

1310 General Requirements. The building envelope shall comply with Sections 1311 through 1314.

The building envelope for all conditioned spaces (as defined in Chapter 2) shall also comply with one of the following paths:

- a. Prescriptive Building Envelope Option Sections 1320 through 1323.
- b. Component Performance Building Envelope Option Sections 1330 through 1334.
- c. Systems Analysis. See Section 1141.4.

EXCEPTION: For semi-heated spaces heated by other fuels only, wall insulation is not required for those walls that separate semi-heated spaces (see definition in Section 201.1) from the exterior provided that the space is heated solely by a heating system controlled by a thermostat with a maximum setpoint capacity of 45 °F, mounted no lower than the heating unit.

1331 General.

Discussion: (1) Add reference to Seattle EnvStd which is referenced in the companion change to Section 701 (incorporates procedure currently allowed by Director's Rule 19-2002) and

(2) add exception to allow the use of the prescriptive option for street-level retail spaces.

Revision: Revise as follows -

1331 General: Buildings or structures whose design heat loss rate (UA_p) and solar heat gain coefficient rate ($SHGC * A_p$) are less than or equal to the target heat loss rate (UA_t) and solar heat gain coefficient rate ($SHGC * A_t$) shall be considered in compliance with this section. The stated U-factor, F-factor or allowable area of any component assembly, listed in Tables 13-1 or 13-2, such as roof/ceiling, opaque wall, opaque door, glazing, floor over conditioned space, slab-on-grade floor, radiant floor or opaque floor may be increased and the U-factor or F-factor for other components decreased, provided that the total heat gain or loss for the entire building envelope does not exceed the total resulting from compliance to the U-factors, F-factors or allowable areas specified in this section.

EXCEPTIONS:

1. Compliance is also allowed to be shown using RS-32.
2. The prescriptive approach in Section 1323 may be used for that portion of the building envelope that complies with Exception 1 to Section 1323.

1411.1 General.

Discussion: Clarify intent for restrictions on single-pass cooling.

Revision: Revise as follows -

1411.1 General: Equipment shall have a minimum performance at the specified rating conditions not less than the values shown in Tables 14-1A through 14-1G. If a nationally recognized certification program exists for a product covered in Tables 14-1A through 14-1G, and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program.

EXCEPTION: Water-cooled water-chilling packages that are not designed for operation at ARI Standard 550/590 test conditions (and thus cannot be tested to meet the requirements of Table 14-1C) of 44°F leaving chilled water temperature and 85°F entering condenser water temperature shall have a minimum NPLV rating as shown in Tables 14-1K, L, and M. The table values are only applicable over the following full load design ranges:

Leaving Chiller Water Temp.:	40 to 48°F
Entering Condenser Water Temp.:	75 to 85°F
Condensing Water Temp. Rise:	5 to 15°F

Chillers designed to operate outside of these ranges are not covered by this Code. Non-standard Part Load Value (NPLV) is defined as single number part-load efficiency figure of merit for chillers references to conditions other than IPLV conditions. Design condenser water flow rate shall not be less than 2.5 gpm/ton.

Gas-fired and oil-fired forced air furnaces with input ratings $\geq 225,000$ Btu/h (65 kW) shall also have an intermittent ignition or interrupted device (IID), and have either mechanical draft (including power venting) or a flue damper. A vent damper is an acceptable alternative to a flue damper for furnaces where combustion air is drawn from the conditioned space. All furnaces with input ratings $\geq 225,000$ Btu/h (65 kW), including electric furnaces, that are not located within the conditioned space shall have jacket losses not exceeding 0.75% of the input rating.

Electric furnaces over 15kW shall have a minimum of two stages of control for heating.

Cooling towers serving chilled water systems with airside economizer complying with Section 1433 without using the exceptions shall be selected to be able to maintain a return condenser water temperature to the tower of 86°F or less at peak design conditions.

Cooling towers serving chilled water systems with waterside economizer shall also comply with Section 1433, Exception 2.

Hydronic heat pump and other cooling and refrigeration equipment (e.g. icemakers, walk-in coolers) shall not use domestic water only one time before dumping it to waste (no single pass water cooling systems are allowed). The only exceptions are: medical and dental equipment; equipment using less than 1 gpm; replacement of existing icemakers; or use of single pass cooling during power outages and other emergencies.

1412.9 Demand Control Ventilation.

Discussion: Add requirement for demand control ventilation per draft revisions to ASHRAE/IESNA Standard 90.1 addendum v second version and the California Energy Code.

Revision: Add a new subsection as follows -

1412.9 Ventilation Controls for High-Occupancy Areas (Demand Ventilation Controls). The following systems shall incorporate means to automatically reduce outside air intake below design rates when spaces are unoccupied or partially occupied (demand ventilation controls):

- a. Single-zone systems where all of the following criteria are met:
 - (1) an air economizer is installed to comply with Sections 1413 and either 1423 or 1433, and
 - (2) design outside airflow is greater than 1,200 cfm, and
 - (3) design occupancy of the spaces served by the system is greater than 40 people per 1,000 ft² of floor area.
- b. All other single-zone where both of the following criteria are met:
 - (1) design outside airflow is greater than 3,000 cfm, and
 - (2) design occupancy of the spaces served by the system is greater than 40 people per 1,000 ft² of floor area.
- c. Multiple-zone where both of the following criteria are met:
 - (1) design outside airflow is greater than 3,000 cfm, and
 - (2) design occupancy averaged over all of the spaces served by the system is greater than 100 people per 1,000 ft² of floor area.

The demand ventilation control system shall have CO₂ sensors installed in each room where the design occupancy is greater than 40 people per 1,000 ft² of floor area for single-zone systems and where the design occupancy is greater than 100 people per 1,000 ft² of floor area for multiple-zone systems. The CO₂ sensors shall be located between one foot and six feet above the floor. Ventilation controls shall be in compliance with ASHRAE Standard 62 and the Seattle Mechanical Code.

Demand ventilation controls shall maintain CO₂ concentrations less than or equal to 600 ppm plus the outdoor air CO₂ concentration in all rooms with CO₂ sensors.

EXCEPTION: The outdoor air ventilation rate is not required to be larger than the design outdoor air ventilation rate required by the Seattle Mechanical Code regardless of CO₂ concentration.

The outdoor air CO₂ concentration shall be assumed to be 400 ppm without any direct measurement or the CO₂ concentration shall be dynamically measured using a CO₂ sensor located near the position of the outdoor air intake.

When the system is operating during hours of expected occupancy, the controls shall maintain system outdoor air ventilation rates no less than the rate listed in the Seattle Mechanical Code for spaces with CO₂ sensors.

CO₂ sensors shall be certified by the manufacturer to have an accuracy of no less than 75 ppm, factory calibrated or calibrated at start-up, and certified by the manufacturer to require calibration no more frequently than once every 5 years.

1413.1 Operation.

Discussion: Revise to eliminate 35 degree exception for waterside economizer. (Companion change to Exception 6 in Section 1433.)

Revision: Revise as follows -

1413.1 Operation: Air economizers shall be capable of automatically modulating outside and return air dampers to provide 100% of the design supply air as outside air to reduce or eliminate the need for mechanical cooling. Air economizers shall be used for RS-29 analysis base case for all systems without exceptions in Sections 1413, 1423, or 1433. Water economizers shall be capable of providing the total concurrent cooling load served by the connected terminal equipment lacking airside economizer, at outside air temperatures of 45°F dry-bulb/40°F wet-bulb and below. For this calculation, all factors including solar and internal load shall be the same as those used for peak load calculations, except for the outside temperatures.

1431.2 Operation.

Discussion: Increase sizing allowance for unusual loads.

Revision: Revise as follows -

1431.2 System Sizing Limits: Heating and cooling design loads for the purpose of sizing systems shall be determined in accordance with one of the procedures described in Chapter 29 of Standard RS-27 listed in Chapter 7 or an equivalent computation procedure. For interior temperatures, 70°F shall be used for heating and 75°F for cooling, except where different values are specified in the Washington Administrative Code (WAC). For exterior temperatures, 24°F shall be used for heating and 82°F drybulb and 66°F wetbulb for cooling.

Building mechanical systems for all buildings which provide space heating and/or space cooling shall be sized no greater than 150% of the design load as calculated above, except that cooling towers shall comply with the sizing requirements in Section 1411.1. No additional safety factor is allowed.

For buildings with a total equipment cooling capacity of 300 tons and above, equipment shall have multiple unloadings or no one unit shall have a capacity of more than 2/3 of the load.

EXCEPTIONS: The following limited exemptions from the sizing limit shall be allowed, however, in all cases heating and/or cooling design load calculations shall be submitted.

1. For a single piece of equipment which has both heating and cooling capability, only one function, either the heating or the cooling, need meet the requirements of this section. Capacity for the other function shall be, within available equipment options, the smallest size necessary to meet the load.
2. Stand-by equipment may be installed if controls and devices are provided which allow redundant equipment to operate automatically only when the primary equipment is not operating..
3. Multiple units of the same equipment type, such as multiple chillers and boilers, with combined capacities exceeding the design load, or a single unit that is capable of modulating to a part-load capacity of 50% of the load or less, may be specified to operate concurrently only if controls are provided that sequence or otherwise optimally control the operation of each unit based on load.
- ~~4. A maximum sizing limit of 150% is allowed for fan systems which:~~
 - ~~a. have both a capacity of 5,000 cfm or greater and which have a minimum outside air supply of 70% or greater of the total air circulation, and~~
 - ~~b. have a heat recovery system complying with Section 1436 without using any of the exceptions.~~

1433 Economizers.

Discussion: (1) Clarify intent for small units and split systems.

(2) Provide exception with prescriptive code alternate to achieve equivalent energy savings to airside economizer in buildings with water-source heat pump loops in lieu of waterside economizer. Alternate includes partial airside economizer and other features. This alternate is similar to submittals received in Seattle using the annual energy analysis method to demonstrate Energy Code compliance. Waterside economizer is a poor choice compared to air economizer for the Seattle climate. Having a partial air economizer supplemented by other features is preferable.

(3) Add new exception with prescriptive alternate for server rooms with high cooling loads.

Revision: Revise as follows -

1433 Economizers: Air economizers meeting the requirements of Section 1413 shall be provided on all new systems including those serving computer server rooms, electronic equipment, radio equipment, telephone switchgear.

EXCEPTIONS: 1. Small units:

- a. cooling units installed outdoors or in a mechanical room adjacent to outdoors with a total cooling capacity less than 20,000 Btu/h.
- b. Other cooling units and split systems with a total cooling capacity less than 54,000 Btu/h.

The total cooling capacity of all such systems in 1.a and 1.b without economizers shall not exceed 240,000 Btu/h per building, or 10% of its air economizer capacity, whichever is greater. That portion of the equipment serving Group R occupancy is not included in determining the total capacity of all units without economizers in a building. Redundant units are not counted in the capacity limitations.

2. Systems complying with all of the following criteria:

- a. Consist of multiple water-source heat pumps with a total cooling capacity for each water-source heat pump of less than 54,000 Btu/h that are connected to a common water loop having a central boiler or furnace providing heat to the loop and having a central cooling tower providing cooling to the loop,
 - b. Have a minimum of 50% air economizer complying with Section 1413 that is ducted in a fully enclosed path directly to every heat pump unit in each zone, except that ducts may terminate within 12 inches of the intake to an HVAC unit provided that they are physically fastened so that the outside air duct is directed into the unit intake,
 - c. Have water-source heat pumps with a capacity-weighted average cooling system efficiency that is a minimum of 10% greater than the requirements in Tables 14-1A and 14-1B (1.10 x values in Tables 14-1A and 14-1B),
 - d. Have a central boiler or furnace efficiency that is a minimum of 8% higher than the value in Table 14-1F (1.08 x value in Table 14-1F), and
 - e. Provide heat recovery with a minimum 50% heat recovery effectiveness as defined in Section 1436 to preheat the outside air supply. This exception shall not be used for RS-29 analysis.
3. Systems for which at least 75% of the annual energy used for mechanical cooling is provided from site-recovery or site-solar energy source.
4. Systems where special outside air filtration and treatment, for the reduction and treatment of unusual outdoor contaminants, makes an air economizer infeasible.
5. Systems that affect other systems (such as dehumidification and supermarket refrigeration systems) so as to increase the overall building energy consumption. New humidification equipment shall comply with Section 1413.4.
6. Equipment used to cool any dedicated server room, electronic equipment room or telecom switch room provided that they completely comply with option a or option b or option c or option d:

- a. For a system where all of cooling equipment is subject to the ARI standards listed in Table 14-1A and Table 14-1B, the system shall comply with all of the following (note that if the system contains any cooling equipment that exceeds the capacity limits in Table 14-1A or Table 14-1B, or if the system contains any cooling equipment that is not included in Table 14-1A or Table 14-1B, then system is not allowed to use this option):
 - 1. The cooling equipment shall have an EER value and an IPLV value that is a minimum of 15% greater than the value listed in Table 14-1A and Table 14-1B (1.15 x values in Tables 14-1A and 14-1B).
 - 2. For units with a total cooling capacity over 85,000 Btu/h, the system shall utilize part-load capacity control schemes that are able to modulate to a part-load capacity of 50% of the load or less that results in the compressor operating at the same or higher EER at part loads than at full load (e.g. minimum of two-stages of compressor unloading such as cylinder unloading, two-stage scrolls, dual tandem scrolls, but hot gas bypass is not credited as a compressor unloading system).
- b. For a system where all of cooling equipment is subject to the ARI standards listed in Table 14-1A and Table 14-1B, the system shall comply with all of the following (note that if the system contains any cooling equipment that exceeds the capacity limits in Table 14-1A or Table 14-1B, or if the system contains any cooling equipment that is not included in Table 14-1A or Table 14-1B, then system is not allowed to use this option):
 - 1. The cooling equipment shall have an EER value and an IPLV value that is a minimum of 5% greater than the value listed in Table 14-1A and Table 14-1B (1.05 x values in Tables 14-1A and 14-1B).

2. For units with a total cooling capacity over 85,000 Btuh, the system shall utilize part-load capacity control schemes that are able to modulate to a part-load capacity of 50% of the load or less that results in the compressor operating at the same or higher EER at part loads than at full load (e.g. minimum of two-stages of compressor unloading such as cylinder unloading, two-stage scrolls, dual tandem scrolls, but hot gas bypass is not credited as a compressor unloading system).
3. The system shall include a water economizer in lieu of air economizer. Water economizers shall be capable of providing the total concurrent cooling load served by the connected terminal equipment lacking airside economizer, at outside air temperatures of 45°F dry-bulb/40°F wet-bulb and below. For this calculation, all factors including solar and internal load shall be the same as those used for peak load calculations, except for the outside temperatures.
- c. For a system with chillers subject to the ARI standards listed in Table 14-1K, Table 14-1L, and Table 14-1M (e.g. a chilled water system with fan coil units), the system shall comply with all of the following:
 1. For air-cooled chillers, the cooling equipment shall have an IPLV value that is a minimum of 5% greater than the IPLV value listed in Table 14-1C (1.05 x values in Table 14-1C). For water-cooled chillers, the cooling equipment shall have an NPLV value that is a minimum of 10% greater than the NPLV value listed in Table 14-1K, Table 14-1L, and Table 14-1M (1.10 x values in Table 14-1K, Table 14-1L, and Table 14-1M).
 2. The chiller shall utilize part-load capacity control schemes that are able to modulate to a part-load capacity of 50% of the load or less that results in the compressor operating at the same or higher EER at part loads than at full load (e.g. minimum of two-stages of compressor unloading such as cylinder unloading, two-stage scrolls, dual tandem scrolls, but hot gas bypass is not credited as a compressor unloading system).
 3. The system shall include a water economizer in lieu of air economizer. Water economizers shall be capable of providing the total concurrent cooling load served by the connected terminal equipment lacking airside economizer, at outside air temperatures of 45°F dry-bulb/40°F wet-bulb and below. For this calculation, all factors including solar and internal load shall be the same as those used for peak load calculations, except for the outside temperatures.
- d. For a system where all of cooling equipment is subject to ASHRAE Standard 127-2001, the system shall comply with all of the following:
 1. The cooling equipment subject to the ASHRAE Standard 127-2001 shall have an EER value and an IPLV value that is equal or greater than the value listed in Table 14-1A and Table 14-1B when determined in accordance with the rating conditions ASHRAE Standard 127-2001 (i.e. not the rating conditions in ARI Standard 210/240 or 340/360).
 2. For units with a total cooling capacity over 85,000 Btuh, the system shall utilize part-load capacity control schemes that are able to modulate to a part-load capacity of 50% of the load or less that results in the compressor operating at the same or higher EER at part loads than at full load (e.g. minimum of two-stages of compressor unloading such as cylinder unloading, two-stage scrolls, dual tandem scrolls, but hot gas bypass is not credited as a compressor unloading system).
 3. The system shall include a water economizer in lieu of air economizer. Water economizers shall be capable of providing the total concurrent cooling load served by the connected terminal equipment lacking airside economizer, at outside air temperatures of 45°F dry-bulb/40°F wet-bulb and below. For this calculation, all factors including solar and internal load shall be the same as those used for peak load calculations, except for the outside temperatures.

This exception shall not be used for RS-29 analysis.

Note: For hydronic systems over 300,000 Btuh, see Section 1432.2.2.

1436.1 Fan Systems.

Discussion: Address heat recovery for systems with high loads.

Revision: Revise as follows -

1436.1 Fan Systems: Fan systems which have both

- (a) a capacity of 5,000 cfm or greater or serve a space with a design heating or cooling load exceeding 150 Btu/h-ft² and
- (b) which have a minimum outside air supply of 70% or greater of the total air circulation shall have a heat recovery system with at least 50% recovery effectiveness. Fifty percent heat recovery effectiveness shall mean an increase in the outside air supply temperature at design heating conditions of one half the difference between the outdoor design air temperature and 65°F. Provisions shall be made to bypass or control the heat recovery system to permit air economizer operation as required by Section 1433. Heat recovery energy may be provided from any site-recovered or site-solar source.

EXCEPTIONS: These exceptions only apply to the particular exhaust subsystems. The remaining cfm of the main supply system is subject to the heat recovery requirements.

- 1. Laboratory systems equipped with both variable air volume supply and variable air volume or two-speed exhaust fume hoods provided that an instruction label is placed on the face of the hood that provides the information in Exhibit 14-1.

Exhibit 14-1

INSTRUCTIONS TO OPERATOR

To be in compliance with the Seattle Energy Code, this fume hood is designed to operate as variable air volume (VAV) by adjusting the sash or controller. Maintain sash in the minimum position during use and close totally when the fume hood is not in use.

- 2. Systems serving spaces heated to less than 60°F.
- 3. Systems which can be shown to use as much energy with the addition of heat recovery equipment as without it.
- 4. Systems exhausting toxic, flammable, paint exhaust or corrosive fumes making the installation of heat recovery equipment impractical.
- 5. Type I commercial kitchen hoods.

1436.2 Condensate Systems.

Discussion: (1) Define “on-site” for the purposes of condensate heat recovery. (2) Add requirement for condensate heat recovery.

Revision: Revise as follows -

1436.2 Condensate Systems: On-site steam heating systems shall have condensate water recovery.

On-site includes a system that is located within or adjacent to one or more buildings within the boundary of a contiguous area or campus under one ownership and which serves one or more of those buildings.

Other buildings with steam heating systems which do not have condensate water recovery shall have condensate heat recovery.

1436.3 Heat Recovery for Service Water Heating.

Discussion: Provide additional option for compliance.

Revision: Revise as follows -

1436.3 Heat Recovery for Service Water Heating: Condenser heat recovery systems shall be installed for heating or preheating of service hot water provided all of the following are true:

- a. The facility operates 24 hours a day.
- b. The total installed heat rejection capacity of the water-cooled systems exceeds 6,000,000 Btu/h of heat rejection.
- c. The capacity of service water heating equipment exceeds 1,000,000 Btu/h.

The required heat recovery system shall have the capacity to provide the smaller of:

- a. 60% of the peak heat rejection load at design conditions, or
- b. preheat of the peak service hot water draw to 85°F, or
- c. 50% of the service water heating load.

EXCEPTIONS: 1. Facilities that employ condenser heat recovery for space heating with a heat recovery design exceeding 30% of the peak water-cooled condenser load at design conditions.

2. Facilities that provide 60% of their service water heating from site solar or site recovered energy or from other sources.

1438.1 Cooling Towers.

Discussion: Limit options to variable speed drive and pony motors.

Revision: Revise as follows -

1438.1 Cooling Towers: All cooling towers with a total fan motor horsepower greater than 10 hp shall be equipped with variable speed drive or with a pony motor of a rated hp no greater than 1/3 of the hp of the primary motor. For pony motors, the cooling tower control shall provide two-stage operation of fans and shall bring on the pony motor to operate without the primary motor while meeting the condenser water setpoint.

Table 14-1A Unitary Air Conditioners and Condensing Units, Electrically Operated.

Discussion: Revise minimum efficiencies for consistency with ASHRAE/IESNA Standard 90.1 addendum i (which is consistent with the U.S. Department of Energy (DOE) rule published on 23 May 2002).

Revision: Revise as follows -

Table 14-1A
Unitary Air Conditioners and Condensing Units, Electrically Operated,
Minimum Efficiency Requirements

Equipment Type	Size Category	Sub-Category or Rating Condition	Minimum Efficiency ^b	Test Procedure ^a
Air Conditioners, Air Cooled	< 65,000 Btu/h ^d	Split System Before 23 Jan 2006: As of 23 Jan 2006:	10.0 SEER 12.0 SEER	ARI 210/240
		Single Package Before 23 Jan 2006: As of 23 Jan 2006:	9.7 SEER 12.0 SEER	
		≥65,000 Btu/h and < 135,000 Btu/h	Split System and Single Package	
	≥135,000 Btu/h and < 240,000 Btu/h	Split System and Single Package	9.7 EER ^c 9.9 IPLV ^c	ARI 340/360
	≥ 240,000 Btu/h and <760,000 Btu/h	Split System and Single Package	9.5 EER ^c 9.7 IPLV ^c	
	≥760,000 Btu/h	Split System and Single Package	9.2 EER ^c 9.4 IPLV ^c	
Through-the-Wall, Air Cooled	< 30,000 Btu/h ^d	Split System Before 23 Jan 2006: As of 23 Jan 2006:	10.0 SEER 10.9 SEER	ARI 210/240
		Single Package Before 23 Jan 2006: As of 23 Jan 2006:	9.7 SEER 10.6 SEER	
Small-Duct High-Velocity, Air Cooled	< 65,000 Btu/h ^d	Split System	10.0 SEER	ARI 210/240
Air Conditioners, Water and Evaporatively Cooled	< 65,000 Btu/h	Split System and Single Package	12.1 EER 11.2 IPLV	ARI 210/240
	≥ 65,000 Btu/h and < 135,000 Btu/h	Split System and Single Package	11.5 EER ^c 10.6 IPLV ^c	
	≥135,000 Btu/h and ≤240,000 Btu/h	Split System and Single Package	11.0 EER ^c 10.3 IPLV ^c	ARI 340/360
	> 240,000 Btu/h	Split System and Single Package	11.0 EER ^c 10.3 IPLV ^c	
Condensing Units, Air Cooled	≥135,000 Btu/h		10.1 EER 11.2 IPLV	ARI 365
Condensing Units, Water or Evaporatively Cooled	≥135,000 Btu/h		13.1 EER 13.1 IPLV	

^a Reserved.

^b IPLVs are only applicable to equipment with capacity modulation.

^c Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.

^d Single-phase air-cooled air-conditioners < 65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

Table 14-1B Unitary and Applied Heat Pumps, Electrically Operated.

Discussion: Revise minimum efficiencies for consistency with ASHRAE/IESNA Standard 90.1 addendum i (which is consistent with the U.S. Department of Energy (DOE) rule published on 23 May 2002).

Revision: Revise as follows -

**Table 14-1B
Unitary and Applied Heat Pumps, Electrically Operated,
Minimum Efficiency Requirements**

Equipment Type	Size Category	Sub-Category or Rating Condition	Minimum Efficiency ^b	Test Procedure ^a
Air Cooled, (Cooling Mode)	< 65,000 Btu/h ^d	Split System Before 23 Jan 2006: As of 23 Jan 2006:	10.0 SEER 12.0 SEER	ARI 210/240
		Single Package Before 23 Jan 2006: As of 23 Jan 2006:	9.7 SEER 12.0 SEER	
	≥65,000 Btu/h and < 135,000 Btu/h	Split System and Single Package	10.1 EER ^c 10.4 IPLV ^c	ARI 340/360
	≥135,000 Btu/h and <240,000 Btu/h	Split System and Single Package	9.3 EER ^c 9.5 IPLV ^c	
	≥240,000 Btu/h	Split System and Single Package	9.0 EER ^c 9.2 IPLV ^c	
Through-the-Wall (Air Cooled, Cooling Mode)	< 30,000 Btu/h ^d	Split System Before 23 Jan 2006: As of 23 Jan 2006:	10.0 SEER 10.9 SEER	ARI 210/240
		Single Package Before 23 Jan 2006: As of 23 Jan 2006:	9.7 SEER 10.6 SEER	
Small-Duct High-Velocity (Air Cooled, Cooling Mode)	< 65,000 Btu/h ^d	Split System	10.0 SEER	ARI 210/240
Water-Source (Cooling Mode)	< 17,000 Btu/h	86°F Entering Water	11.2 EER	ARI/ISO-13256-1
	≥ 17,000 Btu/h and <65,000 Btu/h	86°F Entering Water	12.0 EER	ARI/ISO-13256-1
	≥65,000 Btu/h and < 135,000 Btu/h	86°F Entering Water	12.0 EER	ARI/ISO-13256-1
Groundwater-Source (Cooling Mode)	< 135,000 Btu/h	59°F Entering Water	16.2 EER	ARI/ISO-13256-1
Ground Source (Cooling Mode)	< 135,000 Btu/h	77°F Entering Water	13.4 EER	ARI/ISO-13256-1
Air Cooled (Heating Mode)	< 65,000 Btu/h ^d (Cooling Capacity)	Split System Before 23 Jan 2006: As of 23 Jan 2006:	6.8 HSPF 7.4 HSPF	ARI 210/240
		Single Package Before 23 Jan 2006: As of 23 Jan 2006:	6.6 HSPF 7.4 HSPF	
	≥65,000 Btu/h and < 135,000 Btu/h (Cooling Capacity)	47°F db/43°F wb Outdoor Air 17°F db/15°F wb Outdoor Air	3.2 COP 2.2 COP	

	≥135,000 Btu/h (Cooling Capacity)	47°F db/43°F wb Outdoor Air 17°F db/15°F wb Outdoor Air	3.1 COP 2.0 COP	ARI 340/360
Through-the-Wall (Air Cooled, Heating Mode)	< 30,000 Btu/h ^d	Split System Before 23 Jan 2006: As of 23 Jan 2006:	6.8 HSPF 7.1 HSPF	ARI 210/240
		Single Package Before 23 Jan 2006: As of 23 Jan 2006:	6.6 HSPF 7.0 HSPF	
Small-Duct High-Velocity (Air Cooled, Heating Mode)	< 65,000 Btu/h ^d	Split System	6.8 HSPF	ARI 210/240
Water-Source (Heating Mode)	< 135,000 Btu/h (Cooling Capacity)	68°F Entering Water	4.2 COP	ARI/ISO-13256-1
Groundwater-Source (Heating Mode)	< 135,000 Btu/h (Cooling Capacity)	50°F Entering Water	3.6 COP	ARI/ISO-13256-1
Ground Source (Heating Mode)	< 135,000 Btu/h (Cooling Capacity)	32°F Entering Water	3.1 COP	ARI/ISO-13256-1
^a Reserved. ^b IPLVs and Part load rating conditions are only applicable to equipment with capacity modulation. ^c Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat. ^d Single-phase air-cooled heat pumps < 65,000 Btu/h are regulated by NAECA. SEER and HSPF values are those set by NAECA				

Table 14-1C Water Chilling Packages, Minimum Efficiency Requirements.

Discussion: Add equivalent rating in kW/ton to simplify compliance.

Revision: Revise as follows -

**Table 14-1C
Water Chilling Packages, Minimum Efficiency Requirements**

Equipment Type	Size Category	Maximum kW/ton ^d	Minimum Efficiency	Test Procedure
Air Cooled, With Condenser, Electrically Operated	All Capacities	1.26 1.15	2.80 COP 3.05 IPLV	ARI 550/590
Air Cooled, Without Condenser, Electrically Operated	All Capacities	1.13 1.02	3.10 COP 3.45 IPLV	
Water Cooled, Electrically Operated	< 40 tons	0.84 0.70	4.20 COP 5.05 IPLV	ARI 550/590
	> 40 tons and < 150 Tons	0.79 0.67	4.45 COP 5.25 IPLV	
	≥150 Tons and < 300 Tons	0.63 0.60	5.55 COP ^c 5.90 IPLV	
	≥300 Tons	0.58 0.55	6.10 COP ^c 6.40 IPLV	
Air Cooled Absorption Single Effect	All Capacities		0.60 COP	ARI 560
Water Cooled Absorption Single Effect	All Capacities		0.70 COP	
Absorption Double Effect, Indirect-Fired	All Capacities		1.00 COP 1.05 IPLV	
Absorption Double Effect, Direct-Fired	All Capacities		1.00 COP 1.00 IPLV	

^a Reserved.

^b The chiller equipment requirements do not apply for chillers used in low temperature applications where the design leaving fluid temperature is less than or equal to 40°F.

^c COP requirements do not apply to other than centrifugal equipment.

^d This column is inserted for convenience of users. The values are converted from the COP and IPLV values in the following column using the equation: kW/ton = 1/(COP x 3413/12000).

Table 14-1D Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Room Air Conditioners, and Room Air Conditioner Heat Pumps, Electrically Operated, Minimum Efficiency Requirements.

Discussion: Revise minimum efficiencies for consistency with ASHRAE/IESNA Standard 90.1 addendum d (which contained effective dates of 1 January 2002).

Revision: Revise as follows –

**Table 14-1D
Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps,
Room Air Conditioners, and Room Air Conditioner Heat Pumps,
Electrically Operated, Minimum Efficiency Requirements**

Equipment Type	Size Category	Sub-Category or Rating Condition	Minimum Efficiency ^b	Test Procedure ^a
PTAC (Cooling Mode) New Construction	All capacities	95°F db Outdoor Air	12.5 - (0.213 x Cap/1000) ^b EER	ARI 310/380
		82°F db Outdoor Air	14.7 - (0.213 x Cap/1000) ^b EER	
PTAC (Cooling Mode) New Replacements ^c	All capacities	95°F db Outdoor Air	10.9 - (0.213 x Cap/1000) ^b EER	
		82°F db Outdoor Air	13.1 - (0.213 x Cap/1000) ^b EER	
PTHP (Cooling Mode) New Construction	All capacities	95°F db Outdoor Air	12.3 - (0.213 x Cap/1000) ^b EER	
		82°F db Outdoor Air	14.5 - (0.213 x Cap/1000) ^b EER	
PTHP (Cooling Mode) New Replacements ^c	All capacities	95°F db Outdoor Air	10.8 - (0.213 x Cap/1000) ^b EER	
		82°F db Outdoor Air	13.0 - (0.213 x Cap/1000) ^b EER	
PTHP (Heating Mode) New Construction	All capacities	95°F db Outdoor Air	3.2 - (0.026 x Cap/1000) ^b EER	
PTHP (Heating Mode) New Replacements ^c	All capacities	95°F db Outdoor Air	2.9 - (0.026 x Cap/1000) ^b EER	
SPVAC (Cooling Mode)	All capacities	95°F db/75°F wb Outdoor Air	8.6 EER	ARI-390
SPVHP (Cooling Mode)	All capacities	95°F db/75°F wb Outdoor Air	8.6 EER	
SPVAC (Heating Mode)	All capacities	47°F db/43°F wb Outdoor Air	2.7 COP	
Room Air Conditioners, with Louvered Sides	< 6,000 Btu/h		9.7 EER	ANSI/AHAM RAC-1
	≥ 6,000 Btu/h and < 8,000 Btu/h		9.7 EER	
	≥ 8,000 Btu/h and < 14,000 Btu/h		9.8 EER	
	≥ 14,000 Btu/h and < 20,000 Btu/h		9.7 EER	
	≥ 20,000 Btu/h		8.5 EER	
Room Air Conditioners, without Louvered Sides	< 8,000 Btu/h		9.0 EER	

	≥ 8,000 Btu/h and <20,000 Btu/h		8.5 EER
	≥20,000 Btu/h		8.5 EER
Room Air Conditioners, Heat Pumps with Louvered Sides	< 20,000 Btu/h		9.0 EER
	≥20,000 Btu/h		8.5 EER
Room Air Conditioners, Heat Pumps without Louvered Sides	< 14,000 Btu/h		8.5 EER
	≥14,000 Btu/h		8.0 EER
Room Air Conditioner, Casement Only	All capacities		8.7 EER
Room Air Conditioner, Casement-Slider	All capacities		9.5 EER
^a Reserved. ^b Cap means the rated cooling capacity of the product in Btu/h. If the unit's capacity is less than 7000 Btu/h, use 7000 Btu/h in the calculation. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculation. ^c Replacement units must be factory labeled as follows: "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS." Replacement efficiencies apply only to units with existing sleeves less than 16-in. high and less than 42-in. wide. ^d Casement room air conditioners are not separate product classes under current minimum efficiency column. ^e New room air conditioner standards, covered by NAECA became effective October 1, 2000.			

1513.3 Daylight Zone Control.

Discussion: Incorporate Director's Rule 2-2003.

Revision: Revise as follows -

1513.3 Daylight Zone Control: Lighting in all daylighted zones, as defined in Chapter 2 (see Exhibits 1513.3a and 1513.3b), both under overhead glazing and adjacent to vertical glazing, shall be provided with controls that comply with Sections 1513.3.1 and 1513.3.2.

1513.3.1 Separate Control: Daylight zones shall have controls which control the lights independent of general area lighting.

Contiguous daylight zones adjacent to vertical glazing are allowed to be controlled by a single controlling device provided that they do not include zones facing more than two adjacent cardinal orientations (i.e. north, east, south, west). Daylight zones under overhead glazing more than 15 feet from the perimeter shall be controlled separately from daylight zones adjacent to vertical glazing.

EXCEPTION: Daylight spaces enclosed by walls or ceiling height partitions and containing 2 or fewer light fixtures are not required to have a separate switch for general area lighting.

1513.3.2 Automatic Control: Daylight zones shall have controls which automatically reduce lighting power in response to available daylight by either:

- a. a combination of dimming ballasts and daylight-sensing automatic controls, which are capable of dimming the lights continuously, or
- b. a combination of stepped switching and daylight-sensing automatic controls, which are capable of incrementally reducing the light level in steps automatically and turning the lights off automatically.
 - i. Single-lamp luminaire systems shall have three levels of automatic control: all lamps on, approximately half of the luminaires turned off in a relatively uniform pattern, and then all of the luminaires off. As an alternate, where the daylight zone contains two rows of luminaires and they are parallel to a window, three levels of automatic control may also be achieved by having both rows on, the row closest to the window off and the other row on, and both rows off. For rooms, such as small offices, which contain only a single one-lamp luminaire, it is acceptable for the daylighting control system to automatically switch off the entire luminaire.
 - ii. Two-lamp luminaires shall have three levels of automatic control: both lamps on, one lamp on and one lamp off, and both lamps off. As an alternate, where the daylight zone contains two rows of luminaires and they are parallel to a window, three levels of automatic control may also be achieved by having both rows on, the row closest to the window off and the other row on, and both rows off. For rooms, such as small offices, which contain only a single two-lamp luminaire, it is acceptable for the daylighting control system to automatically switch off the entire luminaire rather than switching off one lamp, then both lamps.
 - iii. Three-lamp luminaires shall have four levels of automatic control: all three lamps on, two lamps on and one lamp off, one lamp on and two lamps off, and all three lamps off.
 - iv. For other multi-lamp luminaires with four or more lamps, the number of required incremental steps shall be equal to one plus the number of lamps in the luminaire.

Any switching devices installed to override the automatic daylighting control shall comply with the criteria in Section 1513.6.2a-e.

EXCEPTIONS: 1. The following are exempt from the requirements for automatic daylighting controls in Section 1513.3.2:

- a. retail spaces adjacent to vertical glazing (retail spaces under overhead glazing are not exempt),
- b. lighting exempted by Section 1512, and

- c. display, exhibition, and specialty lighting complying with Section 1513.4.
- 2. The following spaces are exempt from the requirements for automatic daylighting controls in Section 1513.3.2 provided that they have occupancy sensor controls that comply with Section 1513.6.1:
 - a. small spaces in the daylight zone that are normally unoccupied (such as a storage room with a window, or restrooms),
 - b. rooms less than 300 square feet, and
 - c. conference rooms 300 square feet and larger that have a lighting control system with at least four scene options.
- 3. HID lamps with automatic controls that are capable of reducing the power consumption by at least 50% in lieu of continuous dimming controls in Section 1513.3.2.
- 4. HID lamps 150 watts or less are exempt from the dimming requirements in Section 1513.3.2.

1530 Lighting Power Allowance Option.

Discussion: Count task lighting as 50 Watts per foot of track (rather than 70).

Revision: Revise as follows -

1530 Lighting Power Allowance Option. The installed lighting wattage shall not exceed the lighting power allowance. Lighting wattage includes lamp and ballast wattage. Wattage for fluorescent lamps and ballasts shall be tested per ANSI Standard C82.2-1984.

The wattage used for any unballasted fixture shall be the maximum UL listed wattage for that fixture regardless of the lamp installed. The wattage used for track lighting shall be:

- a. for line voltage track, 50 watts per lineal foot of track or actual luminaire wattage, whichever is greater.
- b. for low voltage track (i.e. with remote transformer) (less than 30 volts), the VA rating of the transformer.

No credit towards compliance with the lighting power allowances shall be given for the use of any controls, automatic or otherwise.

Exit lights that are 5 watts or less per fixture shall not be included in the lighting power allowance calculations. Other exit lights shall be included in the lighting power allowance calculations.

Table 15-1 Unit Lighting Power Allowance.

Discussion: Clarify the application to sport tournament lighting, retail window exemption.

Revision: Revise as follows -

Table 15-1:

TABLE 15-1
Unit Lighting Power Allowance (LPA)

Use ¹	LPA ² (W/ft ²)
Painting, welding, carpentry, machine shops	2.30
Barber shops, beauty shops	2.00
Hotel banquet/conference/exhibition hall ^{3,4}	2.00
Laboratories (see also office and other appropriate categories)	1.80
Aircraft repair hangars	1.50
Cafeterias, fast food establishments ⁵	1.50
Factories, workshops, handling areas	1.50
Gas stations, auto repair shops ⁶	1.50
Institutions	1.50
Libraries ⁵	1.50
Nursing homes and hotel/motel guest rooms	1.50
Retail ¹⁰ , retail banking	1.50
Wholesale stores (pallet rack shelving)	1.50
Mall concourses	1.40
School buildings (Group E occupancy only, school classrooms, day care centers)	1.20
Laundries	1.20
Medical office, clinics ¹²	1.20
Office buildings, office/administrative areas in facilities of other use types (including but not limited to schools, hospitals, institutions, museums, banks, churches) ^{5,7,11}	1.00
Police and fire stations ⁸	1.00
Atria (atriums)	1.00
Assembly spaces ⁹ , auditoriums, gymnasias ⁹ , theaters	1.00
Group R-1 common areas	1.00
Process plants	1.00
Restaurants/bars ⁵	1.00
Locker and/or shower facilities	0.80
Warehouses ¹¹ , storage areas	0.50
Aircraft storage hangars	0.40
Parking garages	See Section 1532
Plans Submitted for Common Areas Only⁷	
Main floor building lobbies ³ (except mall concourses)	1.20
Common areas, corridors, toilet facilities and washrooms, elevator lobbies	0.80

Footnotes for Table 15-1

1. In cases in which a general use and a specific use are listed, the specific use shall apply. In cases in which a use is not mentioned specifically, the *Unit Lighting Power Allowance* shall be determined by the building official. This determination shall be based upon the most comparable use specified in the table. See Section 1512 for exempt areas.

2. The watts per square foot may be increased, by 2% per foot of ceiling height above 20 feet, unless specifically directed otherwise by subsequent footnotes.

3. The watts per square foot of room may be increased by 2% per foot of ceiling height above 12 feet.

4. For all other spaces, such as seating and common areas, use the *Unit Lighting Power Allowance* for assembly.

5. The watts per square foot of room may be increased by 2% per foot of ceiling height above 9 feet.

6. See Section 1532 for exterior lighting.

7. For conference rooms and offices less than 150 square feet with full-height partitions, a Unit Lighting Power Allowance of 1.20 W/ft² may be used.

8. For the fire engine room, the *Unit Lighting Power Allowance* is 1.00 W/ft².

9. For indoor sport tournament courts with adjacent spectator seating, the *Unit Lighting Power Allowance* for the court area is 2.60 W/ft² provided that there is a manual dimmer or at least two additional steps of lighting control in addition to off.

10. Display window illumination installed within 2 feet of the window, provided that the lighting is fitted with LED, tungsten halogen, fluorescent or high intensity discharge lamps and that the display window is separated from the retail space by walls or at least three-quarter-height partitions (transparent or opaque), and lighting for free-standing display where the lighting moves with the display are exempt.

An additional 1.5 W/ft² of merchandise display luminaires are exempt provided that they comply with all three of the following:

- a. located on ceiling-mounted track or directly on or recessed into the ceiling itself (not on the wall),
- b. adjustable in both the horizontal and vertical axes (fluorescent and other fixtures with two points of track attachment are acceptable with vertical axis only),
- c. fitted with LED, tungsten halogen, fluorescent or high intensity discharge lamps.

This additional lighting power is allowed only if the lighting is actually installed.

11. Provided that a floor plan, indicating rack location and height, is submitted, the square footage for a warehouse may be defined, for computing the interior *Unit Lighting Power Allowance*, as the floor area not covered by racks plus the vertical face area (access side only) of the racks. The height allowance defined in footnote 2 applies only to the floor area not covered by racks.

12. Medical and clinical offices include those facilities which, although not providing overnight patient care, do provide medical, dental, or psychological examination and treatment. These spaces include, but are not limited to, laboratories and treatment centers.